Operating Instructions

VEGAFLEX 66

-20 … +250 °C

4 … 20 mA/HART four-wire

Document ID:
34170

Guided Microwave

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Supplementary documentation

Information:
Supplementary documents appropriate to the ordered version come with the delivery. You can find them listed in chapter "*Product description*".

Instructions manuals for accessories and replacement parts

Tip:
To ensure reliable setup and operation of your VEGAFLEX 66, we offer accessories and replacement parts. The corresponding documentations are:

- 27720 - VEGADIS 61
- 30207 - Electronics module VEGAFLEX series 60
- 34296 - Protective cover
- 31088 - Flanges according to DIN-EN-ASME-JIS-GOST
- 30391 - Spacer

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1 About this document

1.1 Function

This operating instructions manual provides all the information you need for mounting, connection and setup as well as important instructions for maintenance and fault rectification. Please read this information before putting the instrument into operation and keep this manual accessible in the immediate vicinity of the device.

1.2 Target group

This operating instructions manual is directed to trained qualified personnel. The contents of this manual should be made available to these personnel and put into practice by them.

1.3 Symbolism used

Information, tip, note
This symbol indicates helpful additional information.

Caution: If this warning is ignored, faults or malfunctions can result.
Warning: If this warning is ignored, injury to persons and/or serious damage to the instrument can result.
Danger: If this warning is ignored, serious injury to persons and/or destruction of the instrument can result.

Ex applications
This symbol indicates special instructions for Ex applications.

- **List**
  The dot set in front indicates a list with no implied sequence.

→ **Action**
This arrow indicates a single action.

1 **Sequence**
Numbers set in front indicate successive steps in a procedure.

2 For your safety

2.1 Authorised personnel

All operations described in this operating instructions manual must be carried out only by trained specialist personnel authorised by the plant operator.

During work on and with the device the required personal protective equipment must always be worn.

2.2 Appropriate use

VEGAFLEX 66 is a sensor for continuous level measurement.

You can find detailed information on the application range in chapter "*Product description*".

Operational reliability is ensured only if the instrument is properly used according to the specifications in the operating instructions manual as well as possible supplementary instructions.

For safety and warranty reasons, any invasive work on the device beyond that described in the operating instructions manual may be carried out only by personnel authorised by the manufacturer. Arbitrary conversions or modifications are explicitly forbidden.

2.3 Warning about misuse

Inappropriate or incorrect use of the instrument can give rise to application-specific hazards, e.g. vessel overfill or damage to system components through incorrect mounting or adjustment.

2.4 General safety instructions

This is a high-tech instrument requiring the strict observance of standard regulations and guidelines. The user must take note of the safety instructions in this operating instructions manual, the country-specific installation standards as well as all prevailing safety regulations and accident prevention rules.

The instrument must only be operated in a technically flawless and reliable condition. The operator is responsible for trouble-free operation of the instrument.

During the entire duration of use, the user is obliged to determine the compliance of the necessary occupational safety measures with the current valid rules and regulations and also take note of new regulations.

2.5 Safety label on the instrument

The safety approval markings and safety tips on the device must be observed.

2.6 CE conformity

This device fulfills the legal requirements of the applicable EC guidelines. By attaching the CE mark, VEGA provides a confirmation of successful testing. You can find the CE conformity declaration in the download area of www.vega.com.

2.7 Fulfillment of NAMUR recommendations

With respect to compatibility, the NAMUR recommendation NE 53 is fulfilled. This applies also to the corresponding indicating and adjustment components. VEGA instruments are generally upward and downward compatible.

- Sensor software to DTM VEGAFLEX 66
- DTM VEGAFLEX 66 for adjustment software PACTware
- Indicating and adjustment module for sensor software

The parameter adjustment of the basic sensor functions is independent of the software version. The range of available functions depends on the respective software version of the individual components.

2.8 Safety instructions for Ex areas

Please note the Ex-specific safety information for installation and operation in Ex areas. These safety instructions are part of the operating instructions manual and come with the Ex-approved instruments.

2.9 Environmental instructions

Protection of the environment is one of our most important duties. That is why we have introduced an environment management system with the goal of continuously improving company environmental protection. The environment management system is certified according to DIN EN ISO 14001.

Please help us fulfil this obligation by observing the environmental instructions in this manual:

- Chapter "*Packaging, transport and storage*"
- Chapter "*Disposal*"

3 Product description

3.1 Structure

Scope of delivery

The scope of delivery encompasses:

- VEGAFLEX 66 level sensor
- Documentation
  - this operating instructions manual
  - Safety Manual 31339 "*VEGAFLEX series 60 - 4 … 20 mA/HART*" (optional)
  - Operating instructions manual 27835 "*Indicating and adjustment module PLICSCOM*" (optional)
  - Supplementary instructions manual "*Plug connector for continuously measuring sensors*" (optional)
  - Ex-specific "*Safety instructions*" (with Ex versions)
  - if necessary, further certificates

Constituent parts

The VEGAFLEX 66 consists of the components:

- Process fitting with probe
- Housing with electronics
- Housing cover, optionally available with indicating and adjustment module

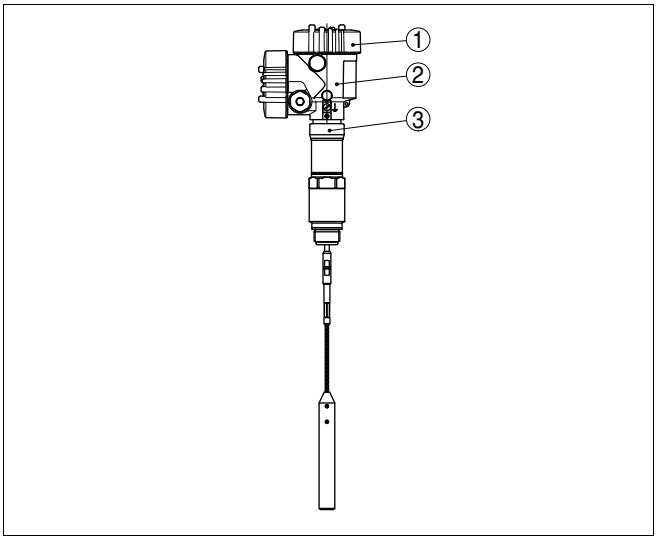

Fig. 1: VEGAFLEX 66 - cable version with double chamber housing

1 Housing cover with integrated indicating and adjustment module (optional)
2 Housing with electronics
3 Process fitting

Type label

The type label contains the most important data for identification and use of the instrument:

- Article number
- Serial number
- Technical data
- Article numbers, documentation
- SIL identification (with SIL rating ex works)

With the serial number, you can access the delivery data of the instrument via www.vega.com, "*VEGA Tools*" and "*serial number search*". In addition to the type label outside, you can also find the serial number on the inside of the instrument.

3.2 Principle of operation

Application area

VEGAFLEX 66 is a level sensor with coax, rod or cable probe for continuous level measurement in products with temperatures between -20 °C and +250 °C (-4 … +482 °F).

It is designed for industrial use in all areas of process technology and can be used in liquids.

Functional principle

High frequency microwave pulses are guided along a steel rope or a rod. Upon reaching the product surface, the microwave pulses are reflected. The running time is evaluated by the instrument and outputted as distance.

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Voltage supply

Four-wire electronics with separate power supply.

The supply voltage range can differ depending on the instrument version.

The data for power supply are specified in chapter "*Technical data*".

Measured value transmission is carried out via the 4 … 20 mA/HART output separate from power supply.

The background lighting of the indicating and adjustment module is powered by the sensor. A certain level of operating voltage is required for this. You can find the exact voltage specifications in chapter "*Technical data*".

3.3 Operation

VEGAFLEX 66 can be adjusted with different adjustment media:

- with indicating and adjustment module
- with the suitable VEGA DTM in conjunction with an adjustment software according to the FDT/DTM standard, e.g. PACTware and PC
- with manufacturer-specific adjustment programs AMS™ or PDM
- With a HART handheld

3.4 Packaging, transport and storage

Packaging

Your instrument was protected by packaging during transport. Its capacity to handle normal loads during transport is assured by a test according to DIN EN 24180.

The packaging of standard instruments consists of environment-friendly, recyclable cardboard. For special versions, PE foam or PE foil is also used. Dispose of the packaging material via specialised recycling companies.

Transport

Transport must be carried out under consideration of the notes on the transport packaging. Nonobservance of these instructions can cause damage to the device.

Transport inspection

The delivery must be checked for completeness and possible transit damage immediately at receipt. Ascertained transit damage or concealed defects must be appropriately dealt with.

Storage

Up to the time of installation, the packages must be left closed and stored according to the orientation and storage markings on the outside.

Unless otherwise indicated, the packages must be stored only under the following conditions:

- Not in the open
- Dry and dust free

- Not exposed to corrosive media
- Protected against solar radiation
- Avoiding mechanical shock and vibration

Storage and transport temperature

- Storage and transport temperature see chapter "*Supplement - Technical data - Ambient conditions*"
- Relative humidity 20 … 85 %

4 Mounting

4.1 General instructions

Suitability for the process conditions

Make sure that all parts of the instrument exposed to the process, in particular the sensor element, process seal and process fitting, are suitable for the existing process conditions. These include above all the process pressure, process temperature as well as the chemical properties of the medium.

You can find the specifications in chapter "*Technical data*" or on the type label.

Mounting position

Select an installation position you can easily reach for mounting and connecting as well as later retrofitting of an indicating and adjustment module. The housing can be rotated by 330° without the use of any tools. You can also install the indicating and adjustment module in four different positions (each displaced by 90°).

Welding work

Before beginning the welding work, remove the electronics module from the sensor. By doing this, you avoid damage to the electronics through inductive coupling.

Handling

With threaded versions, the housing must not be used to screw in the instrument! Applying tightening forces on the housing can damage its internal parts.

Use the hexagon for screwing in.

Moisture

Use the recommended cables (see chapter "*Connecting to power supply*") and tighten the cable gland.

You can give your instrument additional protection against moisture penetration by leading the connection cable downward in front of the cable entry. Rain and condensation water can thus drain off. This applies mainly to outdoor mounting as well as installation in areas where high humidity is expected (e.g. through cleaning processes) or on cooled or heated vessels.

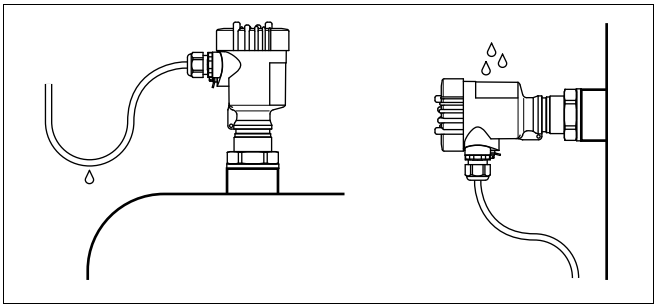

Fig. 2: Measures against moisture penetration

Measuring range

The reference plane for the measuring range of the sensors is the sealing surface of the thread or flange.

Keep in mind that a min. distance must be maintained below the reference plane and possibly also at the end of the probe - measurement in these areas is not possible (dead band). Keep in mind that the cable length cannot be used all the way to the end because measurement in the area of the gravity weight is not possible. These min. distances (dead bands) are listed in chapter "*Technical data*". Keep in mind for the adjustment that the default setting for the measuring range refers to water.

Pressure

The process fitting must be sealed if there is gauge or low pressure in the vessel. Before use, check if the seal material is resistant against the measured product and the process temperature.

The max. permissible pressure is specified in chapter "*Technical data*" or on the type label of the sensor.

4.2 Mounting instructions

Mounting position

Mount VEGAFLEX 66 in such a way that the distance to vessel installations or to the vessel wall is at least 300 mm (12 in).

During operation, the probe must not touch any installations or the vessel wall. If necessary, fasten the probe end.

In vessels with conical bottom it can be advantageous to mount the sensor in the center of the vessel, as measurement is then possible down to the lowest point of the bottom. When using the cable version,

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keep in mind that measurement down to the tip of the probe is not possible. The exact value of the min. distance (lower dead band) is stated in chapter "*Technical data*".

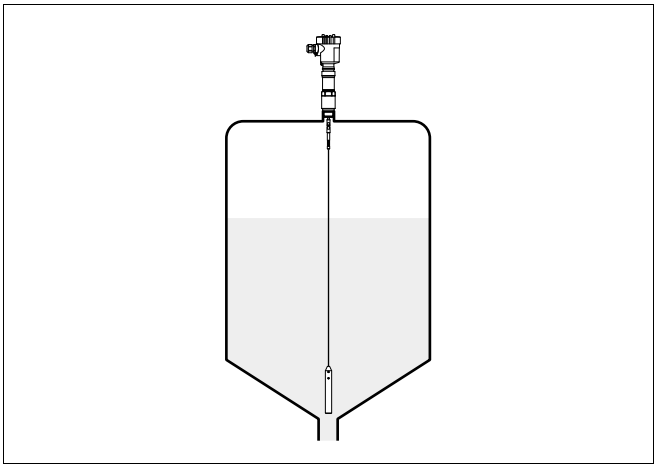


Fig. 3: Vessel with conical bottom

Inflowing medium

Make sure that the probe is not subjected to strong lateral forces. Mount VEGAFLEX 66 at a position in the vessel where no disturbances, e.g. from filling openings, agitators, etc., can occur.

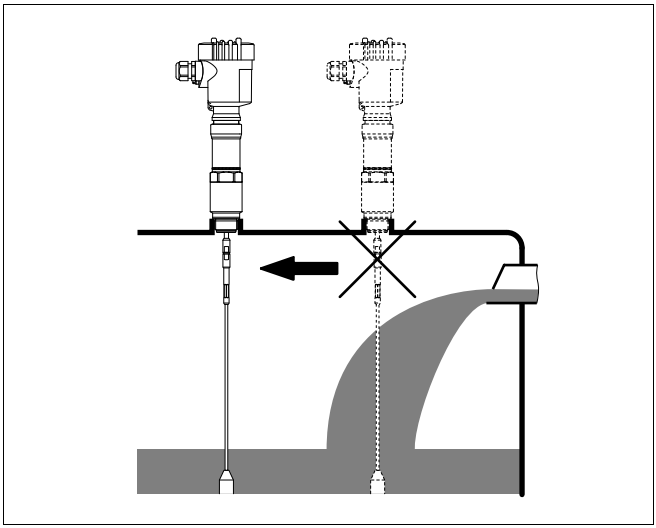


Fig. 4: Lateral load

Excessive system vibration or shocks, e.g. caused by agitators or turbulence in the vessel (e.g. from fluidisation) can cause the coax probe of VEGAFLEX 66 to vibrate in resonance. Should a coax probe of more than 1 m (3.281 in) length should be used, you can provide a suitable support or guy directly above the end of the probe to stabilise it.

Standpipes or bypass tubes

Standpipes or bypass tubes are normally metal tubes with a diameter of 30 … 200 mm (1.18 … 7.87 in). In measurement technology such a tube corresponds to a coax probe. It does not matter if the standpipe is perforated or slotted for better mixing. Lateral inlets with bypass tubes also do not influence the measurement.

Measuring probes can be mounted in bypass tubes up to DN 200.

The max. temperature is 250 °C (482 °F).

If VEGAFLEX 66 is used in standpipes or bypass tubes, contact with the tube wall should be avoided. We offer spacers as accessories for fastening the probe in the middle of the tube.

Depending on the tube diameter or tube length, one or several spacers can be mounted. With cable probes, the cable can also be strained to avoid contact with the tube.

The max. temperature for the spacers is 250 °C (482 °F).

A special high temperature version of VEGAFLEX 66 with integrated bypass tube can be used in applications with temperatures up to 400 °C (752 °F).

Keep in mind that buildup can form on the spacers. Strong buildup can influence the measurement.

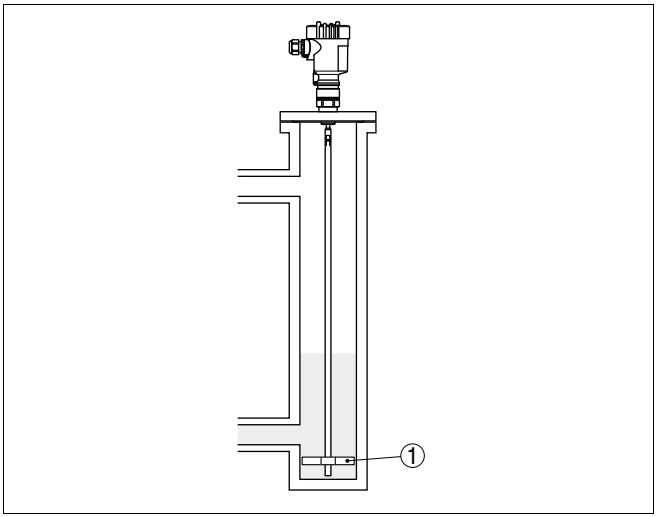


Fig. 5: Position of the spacer

1 Spacer

Note:
Measurement in a standpipe is not recommended for very adhesive products.

Fixing

If there is a danger of the probe touching the vessel wall during operation due to product movements or agitators etc., the measuring probe should be securely fixed.

In the gravity weight there is a thread (M12), e.g. for a ring bolt (optional) - (article no. 2.27424).

Make sure that the probe cable is not completely taut. Avoid tensile loads on the cable.

Avoid undefined cable-vessel connections, i.e. the connection must be either grounded reliably or isolated reliably. Any deviation from this requirement can lead to measurement errors.

Temperature insulation

VEGAFLEX 66 should be integrated in the vessel insulation. This prevents the electronics from strong heating or cooling by temperature radiation.

Make sure that with heated or cooled vessels the permissible ambient temperature on the housing is not exceeded. The permissible ambient temperature is stated in chapter "*Technical data*" under "*Ambient conditions*".

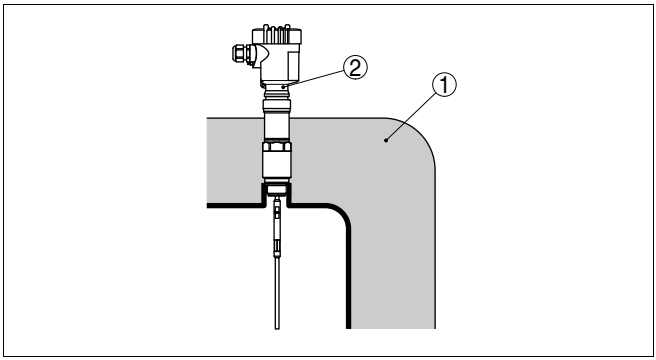


Fig. 6: Vessel with temperature insulation

1 Temperature insulation
2 Ambient temperature on the housing

5 Connecting to power supply

5.1 Preparing the connection

Note safety instructions

Always keep in mind the following safety instructions:

- Connect only in the complete absence of line voltage
- If overvoltage surges are expected, overvoltage arresters should be installed

Tip:
We recommend using VEGA overvoltage arresters B63-48 and ÜSB 62-36G.X.

Take note of safety instructions for Ex applications

In hazardous areas you should take note of the appropriate regulations, conformity and type approval certificates of the sensors and power supply units.

Voltage supply

Supply voltage and current output are carried on separate two-wire connection cables if reliable separation is required. The supply voltage range can differ depending on the instrument version.

The data for power supply are specified in chapter "*Technical data*".

The standard version can be operated with an earth-connected current output, the Exd version must be operated with a floating output.

This instrument is designed in protection class I. To maintain this protection class, it is absolutely necessary that the ground conductor be connected to the internal ground terminal. Take note of the general installation regulations.

Always connect the instrument to vessel ground (potential equalisation) or in case of plastic vessels to the next ground potential. For this purpose there is a ground terminal on the side of the instrument housing.

Connection cable

For power supply, an approved installation cable with PE conductor is necessary.

The 4 … 20 mA current output is connected with standard two-wire cable without screen. If electromagnetic interference is expected which is above the test values of EN 61326 for industrial areas, screened cable should be used.

Use cable with round cross-section. A cable outer diameter of 5 … 9 mm (0.2 … 0.35 in) ensures the seal effect of the cable gland. If you are using cable with a different diameter or cross-section, exchange the seal or use a suitable cable gland.

Cable screening and grounding

If screened cable is necessary, connect the cable screen on both ends to ground potential. In the sensor, the screen must be connected directly to the internal ground terminal. The ground terminal on the outside of the housing must be connected to the potential equalisation (low impedance).

If potential equalisation currents are expected, the connection on the processing side must be made via a ceramic capacitor (e. g. 1 nF, 1500 V). The low frequency potential equalisation currents are thus suppressed, but the protective effect against high frequency interference signals remains.

Installation with Ex applications

Take note of the corresponding installation regulations for Ex applications. In particular, make sure that no potential equalisation currents flow over the cable screen. In case of grounding on both sides this can be achieved by the use of a capacitor or a separate potential equalisation.

With the Exd version, the minus side of the signal output is galvanically connected to ground via protective diodes. When connecting the instrument to a grounded PLC, equalising currents can flow in case of potential differences which can cause malfunctions. Make sure that there is sufficient potential equalisation from the system side or realise the connection via switching amplifier.

5.2 Connection procedure

Proceed as follows:

1 Unscrew the housing cover
2 Loosen compression nut of the cable entry
3 Remove approx. 10 cm (4 in) of the cable mantle (current output), strip approx. 1 cm (0.4 in) insulation from the ends of the individual wires
4 Insert the cable into the sensor through the cable entry
5 Lift the opening levers of the terminals with a screwdriver
6 Insert the wire ends into the open terminals according to the wiring plan
7 Press down the opening levers of the terminals, you will hear the terminal spring closing
8 Check the hold of the wires in the terminals by lightly pulling on them
9 Connect the screen to the internal ground terminal, connect the outer ground terminal to potential equalisation
10 Tighten the compression nut of the cable entry. The seal ring must completely encircle the cable
11 Connect the lead cable for power supply in the same way according to the wiring plan, in addition connect the ground conductor to the inner ground terminal.

12 Screw the housing cover on

The electrical connection is finished.

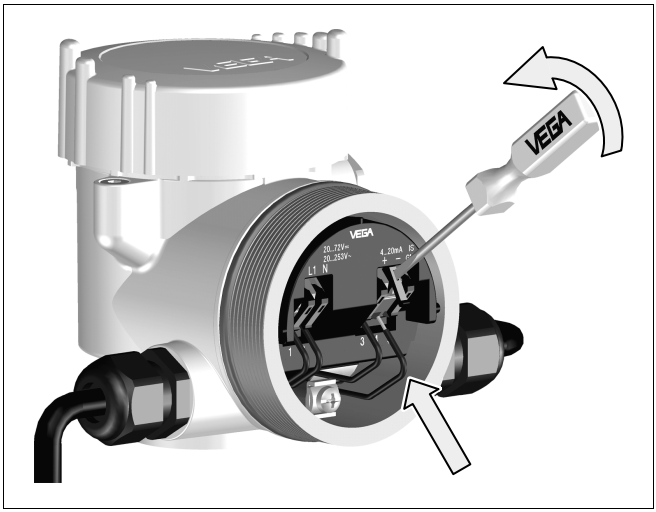


Fig. 7: Connection steps 5 and 6

5.3 Wiring plan, double chamber housing

The following illustration apply to non-Ex as well as Ex ia versions. The Exd version is described in the next subchapter.

Electronics compartment

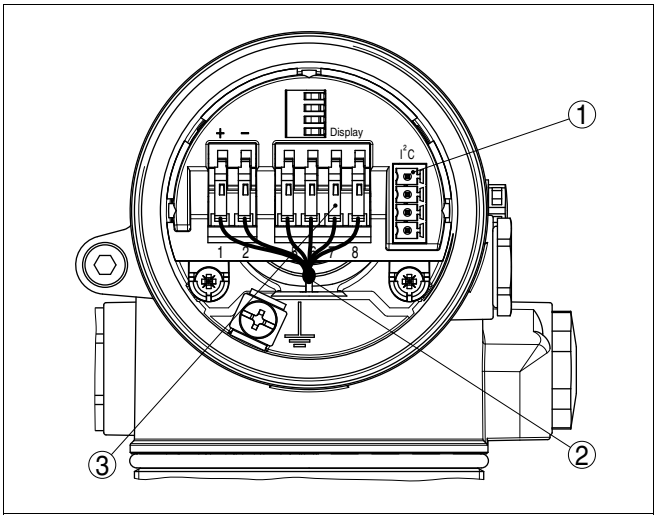


Fig. 8: Electronics compartment, double chamber housing

1 Plug connector for VEGACONNECT (I^2C interface)
2 Internal connection cable to the connection compartment
3 Terminals for VEGADIS 61

Connection compartment

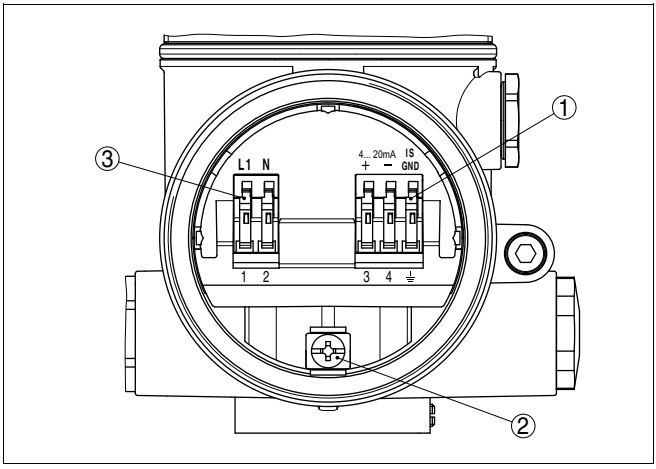


Fig. 9: Connection compartment double chamber housing

1 Spring-loaded terminals for signal output
2 Ground terminal for connection of the ground conductor and screen
3 Spring-loaded terminals for voltage supply

Wiring plan

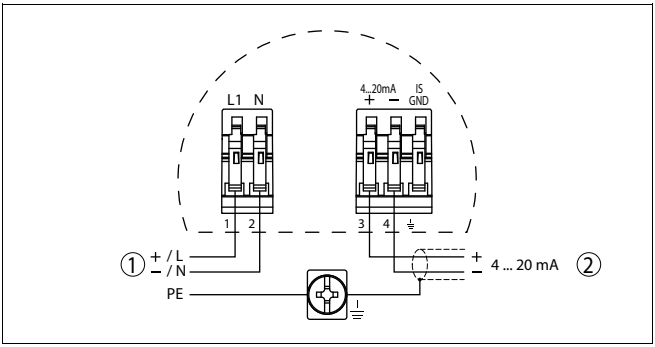


Fig. 10: Wiring plan, double chamber housing

1 Voltage supply
2 Signal output

6 Set up with the indicating and adjustment module PLICSCOM

6.1 Short description

Function/Configuration

The indicating and adjustment module is used for measured value display, adjustment and diagnosis. It can be mounted in the following housing versions and instruments:

- All sensors of the plics® instrument family, in the single as well as in the double chamber housing (optionally in the electronics or connection compartment)
- External indicating and adjustment unit VEGADIS 61

From a hardware version …- 01 or higher of the indicating and adjustment module as well as of the corresponding sensor, an integrated backlight can be switched on via the adjustment menu. The hardware version is stated on the type label of the indicating and adjustment module or the sensor electronics.

Note:
You can find detailed information on the adjustment in the operating instructions manual "*Indicating and adjustment module*".

6.2 Insert indicating and adjustment module

Mount/Dismount indicating and adjustment module

The indicating and adjustment module can be inserted into the sensor and removed again at any time. It is not necessary to interrupt the power supply.

Proceed as follows:

1 Unscrew the housing cover

2 Place the indicating and adjustment module in the desired position on the electronics (you can choose any one of four different positions - each displaced by 90°)

3 Press the indicating and adjustment module onto the electronics and turn it to the right until it snaps in.

4 Screw housing cover with inspection window tightly back on

Removal is carried out in reverse order.

The indicating and adjustment module is powered by the sensor, an additional connection is not necessary.

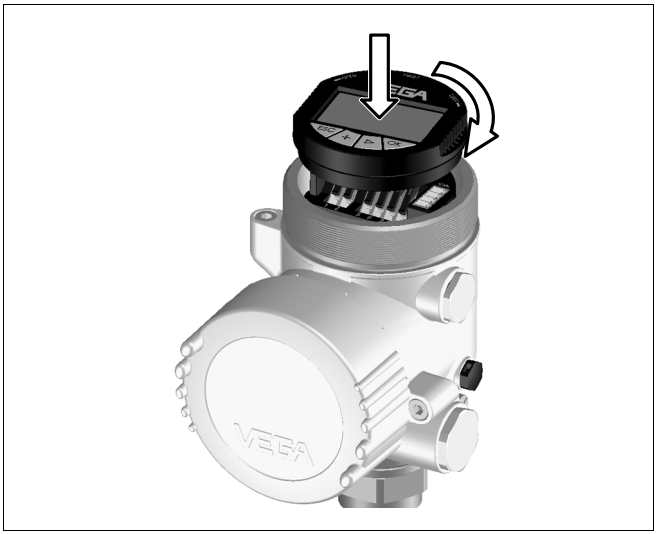


Fig. 11: Insert indicating and adjustment module

Note:
If you intend to retrofit the instrument with an indicating and adjustment module for continuous measured value indication, a higher cover with an inspection glass is required.

6.3 Adjustment system

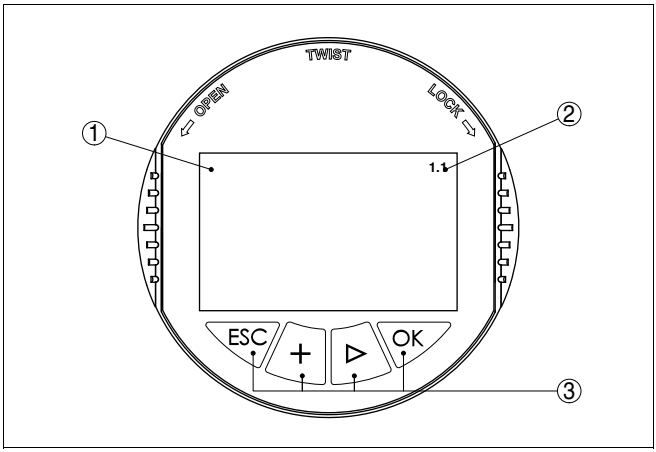


Fig. 12: Indicating and adjustment elements

1 LC display
2 Indication of the menu item number
3 Adjustment keys

Key functions

- ***[OK]*** key:
  - Move to the menu overview
  - Confirm selected menu
  - Edit parameter
  - Save value
- ***[->]*** key to select:
  - Menu change
  - Select list entry
  - Select editing position
- ***[+]*** key:
  - Change value of the parameter
- ***[ESC]*** key:
  - interrupt input
  - jump to the next higher menu

Adjustment system

The sensor is adjusted via the four keys of the indicating and adjustment module. The LC display indicates the individual menu items. The functions of the individual keys are shown in the above illustration. Approx. 10 minutes after the last pressing of a key, an automatic reset to measured value indication is triggered. Any values not confirmed with ***[OK]*** will not be saved.

6.4 Setup steps

Switch on phase

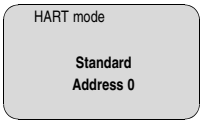
After connecting VEGAFLEX 66 to power supply or after a voltage recurrence, the instrument carries out a self-check for approx. 30 seconds:

- Internal check of the electronics
- Indication of the instrument type, the firmware as well as the sensor TAGs (sensor designation)
- Output signal jumps briefly (approx. 10 seconds) to the set fault current

Then the corresponding current is outputted to the cable (the value corresponds to the actual level as well as the settings already carried out, e.g. factory setting).

Address setting HART-Multidrop

In HART-Multidrop mode (several sensors on one input) the address must be set before continuing with the parameter adjustment. You will find a detailed description in the operating instructions manual "*Indicating and adjustment module*" or in the online help of PACTware or DTM.



Parameter adjustment

As VEGAFLEX 66 is a distance measuring instrument, the distance from the sensor to the product surface is measured. To have the real product level displayed, an allocation of the measured distance to the percentage height must be made. To carry out this adjustment, the distance is entered with full and empty vessel. If these values are not known, an adjustment with the distance values, e.g. 10 % and 90 % is also possible. Starting point for these distance specifications is always the seal surface of the thread or flange. With these settings, the real level is calculated. Furthermore the operating range of the sensor is limited from maximum to the required range.

The real product level during this adjustment is not important, because the min./max. adjustment is always carried out without changing the product level. These settings can be made ahead of time without the instrument having to be installed.

In the main menu item "*Basic adjustment*", the individual submenu items should be selected one after the other and provided with the correct parameter values.

Caution:
If there is a separation of different liquids in the vessel, e.g. by condensation, VEGAFLEX 66 will always detect the medium with the higher dielectric figure (ε_r).

Keep in mind that interfaces can cause faulty measurements.

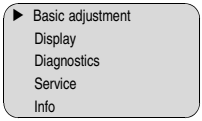
If you want to measure the total height of both liquids reliably, please contact our service department or use an instrument specially designed for interface measurement.

Start your parameter adjustment with the following menu items of the basic adjustment:

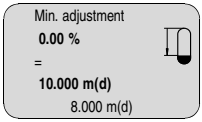
Carry out min. adjustment

Proceed as follows:

1 Move from the measured value display to the main menu by pushing ***[OK]***.



2 Select the menu item "*Basic adjustment*" with ***[->]*** and confirm with ***[OK]***. Now the menu item "*Min. adjustment*" is displayed.



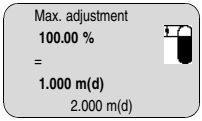
3 Prepare the % value for editing with ***[OK]*** and set the cursor to the requested position with ***[->]***. Set the requested percentage value with ***[+]*** and save with ***[OK]***. The cursor jumps now to the distance value.

4 Enter the suitable distance value in m for the empty vessel (e.g. distance from the sensor to the vessel bottom) corresponding to the percentage value.

5 Save the settings with ***[OK]*** and move to "Max. adjustment" with ***[->]***.

Carry out max. adjustment

Proceed as follows:



1 Prepare the % value for editing with ***[OK]*** and set the cursor to the requested position with ***[->]***. Set the requested percentage value with ***[+]*** and save with ***[OK]***. The cursor jumps now to the distance value.

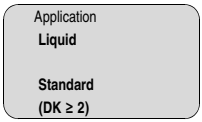
2 Enter the appropriate distance value in m (corresponding to the percentage value) for the full vessel. Keep in mind that the max. level must lie below the dead band.

3 Save the settings with ***[OK]***.

Application

Each product has different reflective properties. In addition, there are various interfering factors which have to be taken into account: agitated product surfaces and foam generation (with liquids); dust generation, material cones and echoes from the vessel wall (with solids). To adapt the sensor to these different conditions, you should first select in this menu item under "*Medium*" either "*Liquid*" or "*Solid*".

With coax versions, this menu item must be set to "*Liquid*".



Depending on the dielectric figure (dielectri value or ε_r), measured products can have a different reflective property. Therefore an additional selection possibility is available.

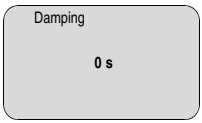
Under "*Sensitivity*" you can select "*Standard (DK ≥ 2)*" or "*Increased sensitivity (DK < 2)*".

Through this the sensor is optimally adapted to the product and measurement reliability, particularly in products with bad reflective properties, is considerably increased.

Enter the requested parameters via the appropriate keys, save your settings and jump to the next menu item with the ***[->]*** key.

Damping

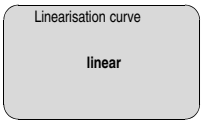
To suppress fluctuations in the measured value display, e. g. caused by an agitated product surface, a damping can be set. This time can be between 0 and 999 seconds. Keep in mind that the reaction time of the entire measurement will then be longer and the sensor will react to measured value changes with a delay. In general, a period of a few seconds is sufficient to smooth the measured value display.



Enter the requested parameters via the appropriate keys, save your settings and jump to the next menu item with the ***[->]*** key.

Linearisation curve

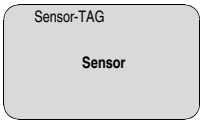
A linearization is necessary for all vessels in which the vessel volume does not increase linearly with the level - e.g. in a horizontal cylindrical or spherical tank - and the indication or output of the volume is required. Corresponding linearization curves are preprogrammed for these vessels. They represent the correlation between the level percentage and vessel volume. By activating the appropriate curve, the volume percentage of the vessel is displayed correctly. If the volume should not be displayed in percent but e.g. in l or kg, a scaling can be also set in the menu item "*Display*".



Enter the requested parameters via the appropriate keys, save your settings and jump to the next menu item with the ***[->]*** key.

Sensor-TAG

In this menu item you can enter an unambiguous designation for the sensor, e.g. the measurement loop name or the tank or product designation. In digital systems and in the documentation of larger plants, a singular designation should be entered for exact identification of individual measuring points.

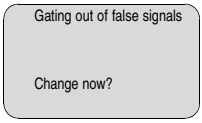


With this menu item, the Basic adjustment is finished and you can now jump to the main menu with the ***[ESC]*** key.

Gating out of false signals

High sockets or vessel installations, such as e.g. struts or agitators as well as buildup and weld joints on the vessel walls cause interfering reflections which can impair the measurement. A false echo storage detects and marks these false echoes, so that they are no longer taken into account for the level measurement. A false echo memory should be created with empty vessel so that all potential interfering reflections will be detected.

Probes in coax version require no gating out of false echoes since they are not influenced by false reflections.



Proceed as follows:

1 Move from the measured value display to the main menu by pushing ***[OK]***.

2 Select the menu item "*Service*" with ***[->]*** and confirm with ***[OK]***. Now the menu item "*False signal suppression*" is displayed.

3 Confirm "*False signal suppression - Change now*" with ***[OK]*** and select in the below menu "*Create new*". Enter the actual distance from the sensor to the product surface. All false signals in this area are detected by the sensor and saved after confirming with ***[OK]***.

Note:
Check the distance to the product surface, because if an incorrect (too large) value is entered, the existing level will be saved as false signal. The filling level would then no longer be detectable in this area.

Copy sensor data

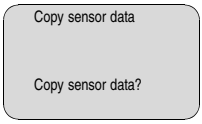
This function enables reading out parameter adjustment data as well as writing parameter adjustment data into the sensor via the indicating and adjustment module. A description of the function is available in the operating instructions manual "*Indicating and adjustment module*".

The following data are read out or written with this function:

- Measured value presentation
- Adjustment
- Medium
- Vessel form
- Damping
- Linearisation curve
- Sensor-TAG
- Displayed value
- Display unit
- Scaling
- Current output
- Unit of measurement
- Language
- Sensitivity

The following safety-relevant data are **not** read out or written:

- HART mode
- PIN
- SIL
- Sensor length/Sensor type
- Gating out of false signals



Reset

Basic adjustment

If the function "*Reset*" is carried out, the sensor resets the values of the following menu items to the reset values (see chart):[1)]

The following values will be reset:

Function	Reset value
Max. adjustment	Distance, upper dead zone
Min. adjustment - Rod/Coax version	Distance, supplied sensor length
Min. adjustment - Cable version	Distance, lower dead zone
Damping ti	0 s
Linearisation	linear
Sensor-TAG	Sensor
Display	Distance
Current output - characteristics	4 … 20 mA
Current output - max. current	20 mA
Current output - min. current	4 mA
Current output - failure	< 3.6 mA
Application - rod/coax version	Liquid
Application - Cable version	Bulk solid

The values of the following menu items are *not* reset to the reset values (see chart) with "**Reset**":

Menu item	Reset value
Lighting	No reset
Language	No reset
SIL	No reset
HART mode	No reset

Factory setting

Like basic adjustment, in addition, special parameters are reset to default values.[2)]

Pointer

The min. and max. values are reset to the actual value.

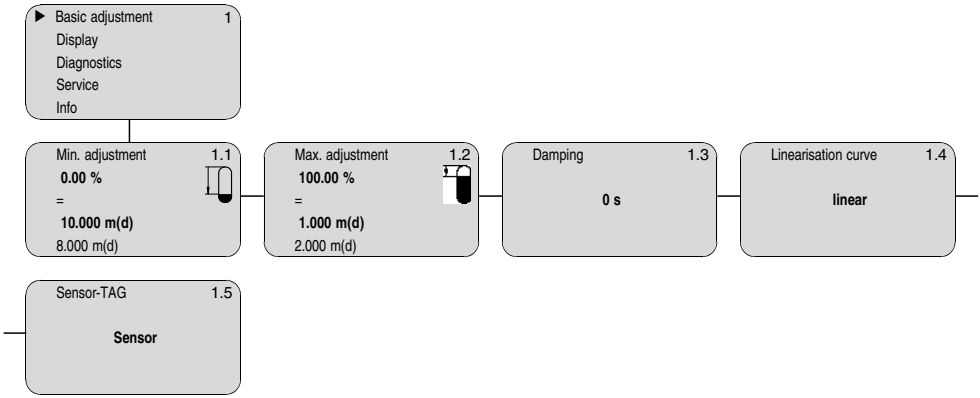
Optional settings

Additional adjustment and diagnosis options such as e.g. scaling, simulation or trend curve presentation are shown in the following menu schematic. You will find a detailed description of these menu items in the operating instructions manual "*Indicating and adjustment module*".

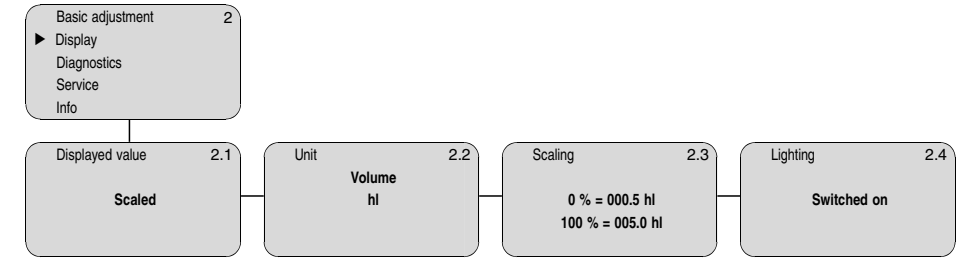
1) Sensor-specific basic adjustment.
2) Special parameters are parameters which are set customer-specifically on the service level with the adjustment software PACTware.

6.5 Menu schematic

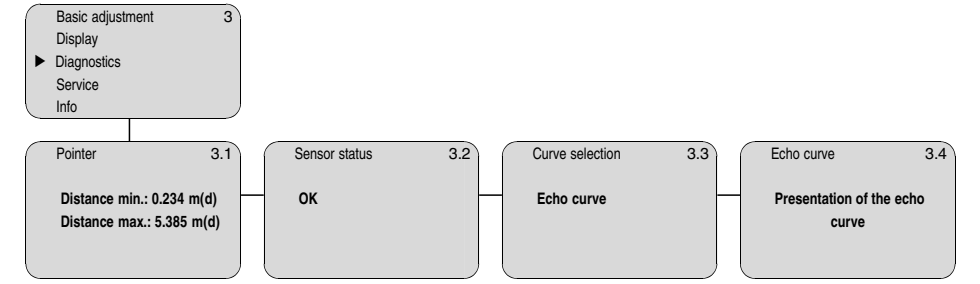
Basic adjustment



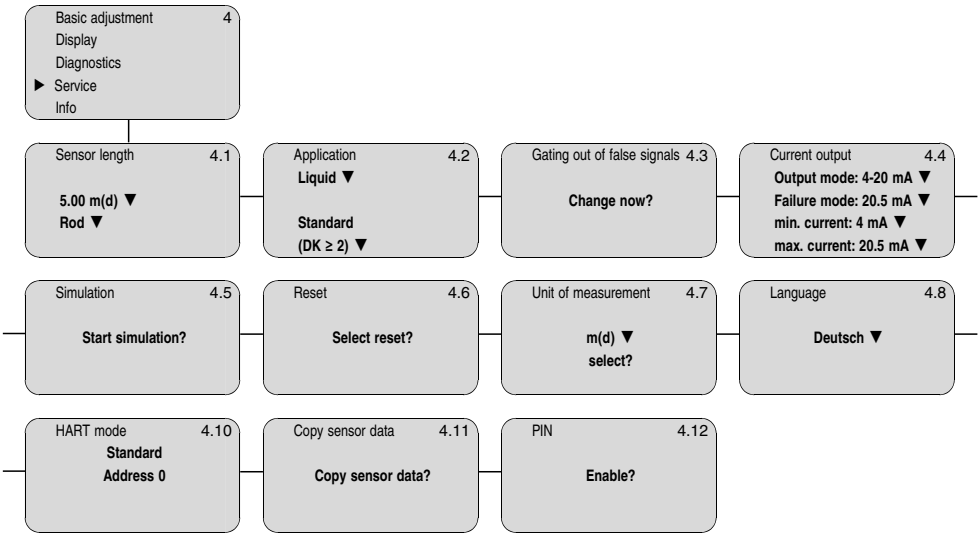
Display



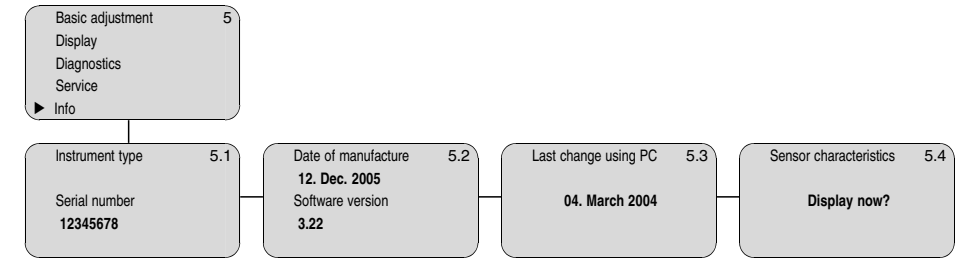
Diagnostics



Service



Info



6.6 Saving the parameter adjustment data

It is recommended noting the adjusted data, e.g. in this operating instructions manual and archive them afterwards. They are hence available for multiple use or service purposes.

If VEGAFLEX 66 is equipped with an indicating and adjustment module, the most important data can be read out of the sensor into indicating and adjustment module. The procedure is described in the operating instructions manual "*Indicating and adjustment module*" in the menu item "*Copy sensor data*". The data remain there permanently even if the sensor power supply fails.

If it is necessary to exchange the sensor, the indicating and adjustment module is inserted into the replacement instrument and the data are written into the sensor under the menu item "*Copy sensor data*".

7 Set up with PACTware and other adjustment programs

7.1 Connecting the PC

VEGACONNECT directly on the sensor

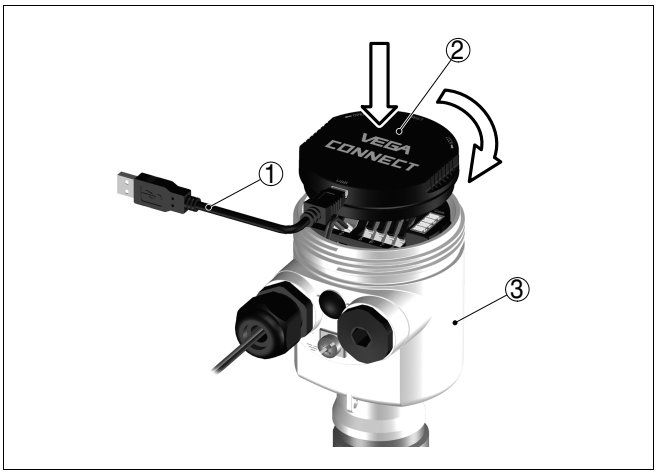


Fig. 13: Connection of the PC via VEGACONNECT directly to the sensor

1 USB cable to the PC
2 VEGACONNECT
3 Sensor

VEGACONNECT externally

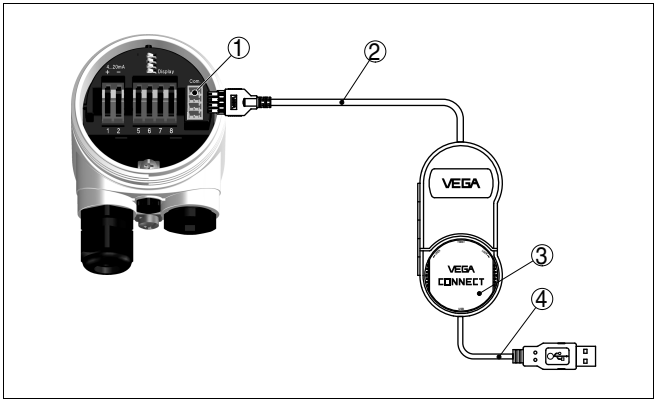


Fig. 14: Connection via VEGACONNECT externally

1 I^2C bus (com.) interface on the sensor
2 I^2C connection cable of VEGACONNECT
3 VEGACONNECT
4 USB cable to the PC

34170-EN-100427

Necessary components:

- VEGAFLEX 66
- PC with PACTware and suitable VEGA DTM
- VEGACONNECT
- Power supply unit or processing system

Connection via HART

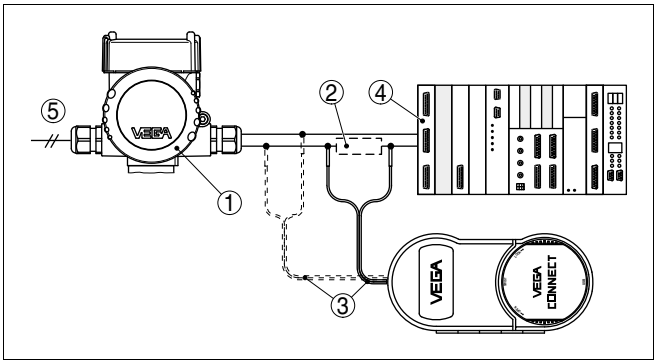


Fig. 15: Connecting the PC via HART to the signal cable

1 VEGAFLEX 66
2 HART resistance 250 Ω (optional depending on processing)
3 Connection cable with 2 mm pins and terminals
4 Processing system/PLC/Voltage supply

Necessary components:

- VEGAFLEX 66
- PC with PACTware and suitable VEGA DTM
- VEGACONNECT 4
- HART resistance approx. 250 Ω
- Power supply unit or processing system

Note:
With power supply units with integrated HART resistance (internal resistance approx. 250 Ω), an additional external resistance is not necessary. This applies, e. g. to the VEGA instruments VEGATRENN 149A, VEGADIS 371, VEGAMET 381. Common Ex separators are also usually equipped with a sufficient current limitation resistance. In such cases, VEGACONNECT 4 can be connected parallel to the 4 … 20 mA cable.

7.2 Parameter adjustment with PACTware

Further setup steps are described in the operating instructions manual "*DTM Collection/PACTware*" attached to each CD and which can also be downloaded from our homepage. A detailed description is available in the online help of PACTware and the VEGA DTMs.

Note:
Keep in mind that for setup of VEGAFLEX 66, DTM-Collection in the actual version must be used.

All currently available VEGA DTMs are included as a DTM Collection on a CD. They can be purchased for a token fee from the responsible VEGA agency. In addition, the actual PACTware version is also available on this CD.

In addition, this DTM Collection incl. the basic version of PACTware can be downloaded free of charge from the Internet. Move via www.vega.com and "*Downloads*" to "*Software*".

7.3 Parameter adjustment with AMS™ and PDM

For VEGA sensors, instrument descriptions for the adjustment programs AMS™ and PDM are available as DD or EDD. The instrument descriptions are already implemented in the current versions of AMS™ and PDM.

For older versions of AMS™ and PDM, a free-of-charge download is available via Internet. Move via www.vega.com and "*Downloads*" to "*Software*".

7.4 Saving the parameter adjustment data

It is recommended to document or save the parameter adjustment data. That way they are available for multiple use or service purposes.

The VEGA DTM Collection and PACTware in the licensed, professional version provide suitable tools for systematic project documentation and storage.

8 Maintenance and fault rectification

8.1 Maintenance

When used as directed in normal operation, VEGAFLEX 66 is completely maintenance free.

8.2 Rectify malfunctions

Reaction when malfunctions occur

The operator of the system is responsible for taking suitable measures to remove interferences.

Causes of malfunction

VEGAFLEX 66 offers maximum reliability. Nevertheless, faults can occur during operation. These may be caused by the following, e.g.:

- Sensor
- Process
- Voltage supply
- Signal processing

Fault rectification

The first measures to be taken are to check the output signals as well as to evaluate the error messages via the indicating and adjustment module. The procedure is described below. Further comprehensive diagnostics can be carried out on a PC with the software PACTware and the suitable DTM. In many cases, the causes can be determined this way and faults rectified.

24 hour service hotline

However, should these measures not be successful, call the VEGA service hotline in urgent cases under the phone no. **+49 1805 858550**.

The hotline is available to you 7 days a week round-the-clock. Since we offer this service world-wide, the support is only available in the English language. The service is free of charge, only the standard telephone costs will be charged.

Checking the 4 … 20 mA signal

Connect a handmultimeter in the suitable measuring range according to the wiring plan. The following table describes possible errors in the current signal and helps to remove them:

Error	Cause	Removal
4 … 20 mA signal not stable	Level fluctuations	Set damping via the indicating and adjustment module
4 … 20 mA signal missing	Electrical connection faulty	Check connection according to chapter "*Connection steps*" and if necessary, correct according to chapter "*Wiring plan*"

Error	Cause	Removal
	Voltage supply missing	Check cables for breaks; repair if necessary
	Operating voltage too low or load resistance too high	Check, adapt if necessary
Current signal greater than 22 mA or less than 3.6 mA	Oscillator in the sensor defective	Exchange the instrument or send it in for repair

In Ex applications, the regulations for the wiring of intrinsically safe circuits must be observed.

Error messages via the indicating and adjustment module

The indicating and adjustment modules indicates faults via error codes and text messages. The following table describes the error codes with status according to NE 107 and gives information on the causes of failure and their removal:

Status according to NE 107	Error code	Text message	Cause/Rectification
Failure	E013	no measured value available	Sensor in boot phase
		no measured value available	Sensor does not find an echo, e.g. due to faulty installation or wrong parameter adjustment
		no measured value available	Wrong sensor length entered
	E017	Adjustment span too small	Adjustment not within the specification. Carry out the adjustment again, increasing the distance between min. and max. adjustment
	E036	No operable software	Failed or interrupted software update/Repeat software update
	E042	Hardware error, electronics defective	Exchange the instrument or send it in for repair
	E043	Hardware error, electronics defective	Exchange the instrument or send it in for repair

Reaction after fault rectification

Depending on the failure reason and measures taken, the steps described in chapter "*Set up*" must be carried out again, if necessary.

8.3 Exchanging the electronics module

If the electronics module is defective, it can be replaced by the user.

In Ex applications only one instrument and one electronics module with respective Ex approval may be used.

If there is no electronics module available on site, one can be ordered from the VEGA agency serving you.

Sensor serial number

The new electronics module must be loaded with the settings of the sensor. These are the options:

- At the factory by VEGA
- Or on site by the user

In both cases, the sensor serial number is necessary. The serial numbers are stated on the type label of the instrument, inside the housing or on the delivery note.

Information:
When loading on site, first of all the order data must be downloaded from the Internet (see operating instructions manual "*Oscillator*").

Assignment

The electronics modules are adapted to the respective sensor and distinguish also in the signal output or power supply.

4 … 20 mA/HART - four-wire

Electronics module FX-E.60V suitable for VEGAFLEX 61, 62, 63 - 4 … 20 mA/HART four-wire:

- FX-E.60V**X** (X = without approvals)
- FX-E.60V**A** (A = approval DA according to product list)
- FX-E.60V**C** (C = approvals DX, EX, GX according to product list)

8.4 Software update

The software version of VEGAFLEX 66 can be determined as follows:

- on the type label of the electronics
- via the indicating and adjustment module
- via PACTware

You can view all software histories on our website www.vega.com. Make use of this advantage and get registered for update information via e-mail.

The following components are required to update the sensor software:

- Sensor
- Voltage supply
- VEGACONNECT
- PC with PACTware
- Current sensor software as file

Load sensor software to PC

At "www.vega.com/downloads" go to "*Software*". Select under "*plics instruments and sensors*" the suitable instrument series. Load the zip file via the right mouse key with "*Save target as*" e.g. on the desktop of your PC. Extract all files available in the zip file, e.g. to the desktop.

Prepare update

Connect the sensor to power supply and provide connection from PC to the instrument via VEGACONNECT. Start PACTware and provide connection to the sensor, e.g. via the VEGA project assistant. Close the parameter window of the sensor, as far as open.

Load software into sensor

Go in the PACTware menu bar to "*Instrument data*", "*Additional functions*" and "*Update instrument software*".

PACTware now checks the actual hardware and software version of the sensor and displays the data. This procedure lasts approx. 60 s.

Push the button "***Update software***" and select the previously extracted hex file. Then the software update can be started. The additional files are installed automatically. Depending on the sensor, this procedure can last approximately 1 h.

8.5 Instrument repair

If a repair is necessary, please proceed as follows:

You can download a return form (23 KB) from our Internet homepage www.vega.com under: "*Downloads - Forms and certificates - Repair form*".

By doing this you help us carry out the repair quickly and without having to call back for needed information.

- Print and fill out one form per instrument
- Clean the instrument and pack it damage-proof
- Attach the completed form and, if need be, also a safety data sheet outside on the packaging
- Please ask the agency serving you for the address of your return shipment. You can find the respective agency on our website www.vega.com under: "*Company - VEGA worldwide*"

Return of rod versions

On instruments with exchangeable rod, the rod must be unscrewed for transport to avoid damages.

Return the parts separately for repair.

To loosen to rod, you require a fork spanner with wrench size 8.

1 Loosen the rod with a fork spanner (SW 8) applied to the flat surfaces, provide counterforce with another fork spanner (SW 8)

2 Twist off the loosened rod manually

See also chapter "*Maintenance and fault rectification*"/"*Exchange cable/rod*"

9 Dismounting

9.1 Dismounting steps

Warning:
Before dismounting, be aware of dangerous process conditions such as e.g. pressure in the vessel, high temperatures, corrosive or toxic products etc.

Take note of chapters "*Mounting*" and "*Connecting to power supply*" and carry out the listed steps in reverse order.

9.2 Disposal

The instrument consists of materials which can be recycled by specialised recycling companies. We use recyclable materials and have designed the electronics to be easily separable.

WEEE directive 2002/96/EG
This instrument is not subject to the WEEE directive 2002/96/EG and the respective national laws. Pass the instrument directly on to a specialised recycling company and do not use the municipal collecting points. These may be used only for privately used products according to the WEEE directive.

Correct disposal avoids negative effects to persons and environment and ensures recycling of useful raw materials.

Materials: see chapter "*Technical data*"

If you have no way to dispose of the old instrument properly, please contact us concerning return and disposal.

10 Supplement

10.1 Technical data

General data

Material 316L corresponds to 1.4404 or 1.4435

Materials, wetted parts	
– Process fitting - coax version	316L and PEEK GF30, Hastelloy C22 (2.4602) and PEEK GF30
– Process fitting - rod version	316L and PEEK GF30, Hastelloy C22 (2.4602) and PEEK GF30
– Process fitting - cable version	316L and PEEK GF30
– Tube: ø 21.3 mm (0.839 in)	316L or Hastelloy C22 (2.4602)
– Rod: ø 6 mm (0.236 in)	316L or Hastelloy C22 (2.4602)
– Cable: ø 2 mm (0.079 in)	316 (1.4401)
– Cable: ø 4 mm (0.157 in)	316 (1.4401)
– Gravity weight (optionally available)	316L
– Process seal on the instrument side (cable/rod leadthrough)	FFKM (Kalrez 6375)
– Process seal	On site (instruments with thread: Klingersil C-4400 is attached)
Materials, non-wetted parts	
– Aluminium die-casting housing	Aluminium die-casting AlSi10Mg, powder-coated - basis: Polyester
– Stainless steel housing - precision casting	316L
– Seal between housing and housing cover	NBR (stainless steel housing, investment casting), silicone (Aluminium housing)
– Inspection window in housing cover (optional)	Polycarbonate
– Ground terminal	316L
Process fittings	
– Pipe thread, cylindrical (DIN 3852-A)	G¾ A, G1 A, G1½ A
– American pipe thread, conical (ASME B1.20.1)	¾ NPT, 1 NPT, 1½ NPT
– Flanges	DIN from DN 25, ANSI from 1"
Weight	
– Instrument weight (depending on process fitting)	approx. 0.8 … 8 kg (0.176 … 17.64 lbs)
– Tube: ø 21.3 mm (0.839 in)	approx. 920 g/m (9.9 oz/ft)
– Rod: ø 6 mm (0.236 in)	approx. 220 g/m (2.365 oz/ft)
– Cable: ø 2 mm (0.079 in)	approx. 20 g/m (0.215 oz/ft)

– Cable: ø 4 mm (0.157 in)	approx. 80 g/m (0.86 oz/ft)
– Gravity weight	approx. 325 g (11.5 oz)
Probe length L (from seal surface)	
– Tube: ø 21.3 mm (0.839 in)	up to 6 m (19.69 ft)
– Trimming accuracy - tube	< 1 mm (0.039 in)
– Rod: ø 6 mm (0.236 in)	up to 4 m (13.12 ft)
– Trimming accuracy - rod	< 1 mm (0.039 in)
– Cable: ø 2 mm (0.079 in)	up to 32 m (105 ft)
– Cable: ø 4 mm (0.157 in)	up to 32 m (105 ft)
– Trimming accuracy - cable	±0.05 %
Lateral load	
– Tube: ø 21.3 mm (0.839 in)	60 Nm (44 lbf ft)
– Rod: ø 6 mm (0.236 in)	4 Nm (3 lbf ft)
Max. tensile load with cable: ø 2 mm (0.079 in)	1.5 KN (337 lbf)
Max. tensile load with cable: ø 4 mm (0.157 in)	2.5 KN (562 lbf)
Thread in gravity weight (cable version)	M 12

Input variable

Measured variable	Level of liquids
Min. dielectric figure of the medium - coax version	$\varepsilon_r > 1.4$

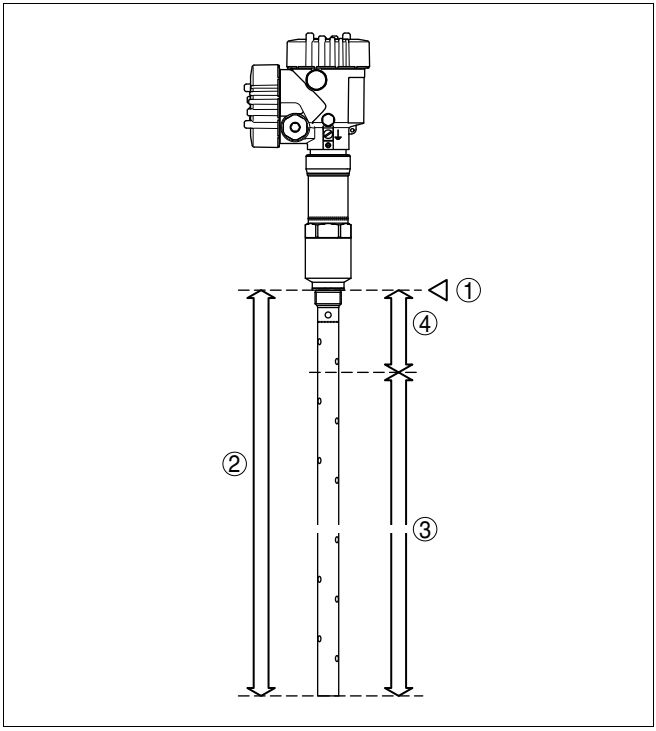


Fig. 16: Measuring range of VEGAFLEX 66 - coax version

1 Reference plane
2 Probe length
3 Measuring range (default setting refers to the measuring range in water)
4 Upper dead band (see diagrams under Accuracy - grey section)
5 Lower dead band (see diagrams under Accuracy - grey section)

Min. dielectric figure of the medium - rod, cable version $\varepsilon_r > 1.6$

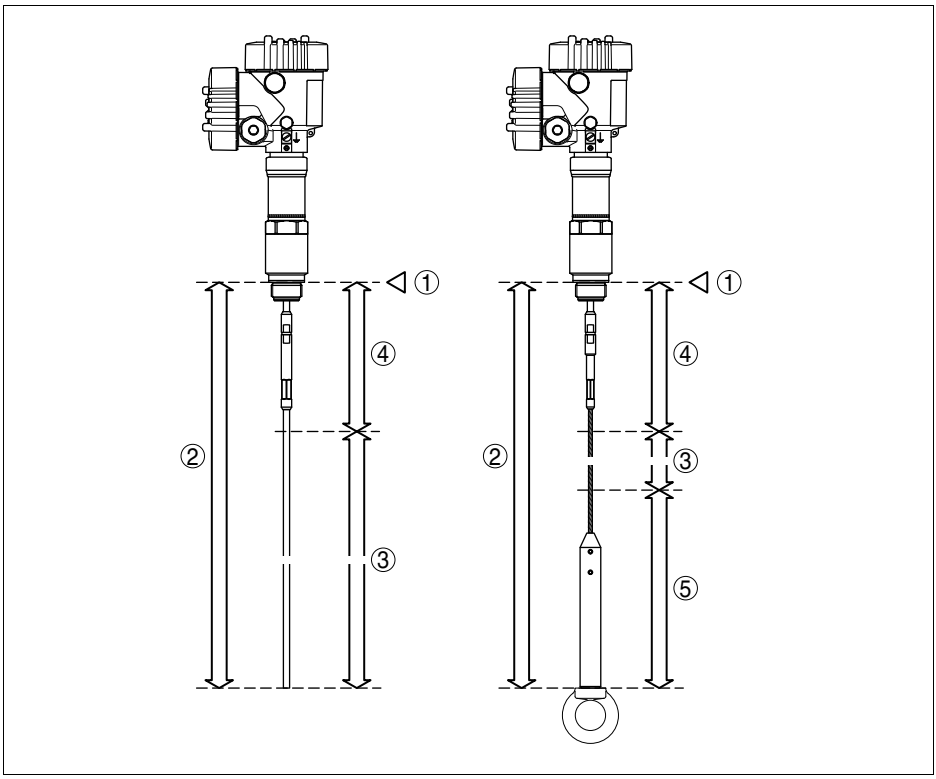


Fig. 17: Measuring ranges of the VEGAFLEX 66 - rod and cable version

1 *Reference plane*
2 *Probe length*
3 *Measuring range*
4 *Upper dead band (see diagrams under Accuracy - grey section)*
5 *Lower dead band (see diagrams under Accuracy - grey section)*

Output variable	
Output signal	4 … 20 mA/HART (active)
Cycle time	min. 1 s (dependent on the parameter setting)
Signal resolution	1.6 µA
Failure signal current output (adjustable)	mA value unchanged 20.5 mA, 22 mA, < 3.6 mA (adjustable)
Max. output current	22 mA
Load	< 500 Ω[3)]
Damping (63 % of the input variable)	0 … 999 s, adjustable

[3)] With inductive load ohmic share min. 25 Ω/mH.

Fulfilled NAMUR recommendations	NE 43
HART output values	
– 1. HART value (Primary Value)	Distance to the level
– 2. HART value (Secondary Value)	Distance to the level - scaled (for example hl, %)
Resolution, digital	> 1 mm (0.039 in)

Accuracy (similar to DIN EN 60770-1)

Process reference conditions according to DIN EN 61298-1	
– Temperature	+18 … +30 °C (+64 … +86 °F)
– Relative humidity	45 … 75 %
– Air pressure	+860 … +1060 mbar/+86 … +106 kPa (+12.5 … +15.4 psig)
Installation reference conditions	
– Min. distance to installations	> 500 mm (19.69 in)
– Vessel	metallic, ø 1 m (3.281 ft), centric installation, process fitting flush with the vessel ceiling
– Medium	Water/Oil (Dk value ~2.0)
– Installation	Probe end does not touch the vessel bottom
Sensor parameter adjustment	Gating out of false signals carried out In bulk solids applications, implementing a false signal suppression is generally not recommended. The accuracy of bulk solid applications depends considerably on the application. Hard and fast accuracy specifications are thus not available.
Deviation	see diagrams Depending on the installation conditions, there can be deviations which can be rectified with an adaptation of the adjustment or a change of the measured value offset in the DTM service mode.

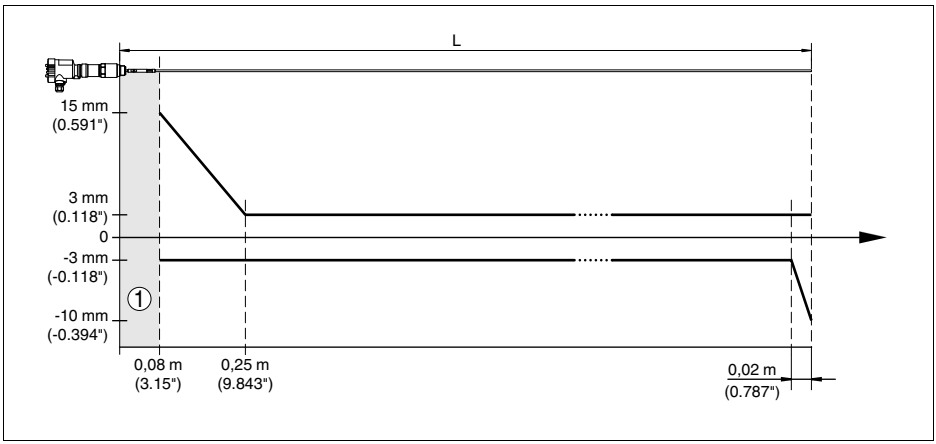


Fig. 18: Deviation VEGAFLEX 66 in rod version in water

1 Dead zone - no measurement possible in this area
L Probe length

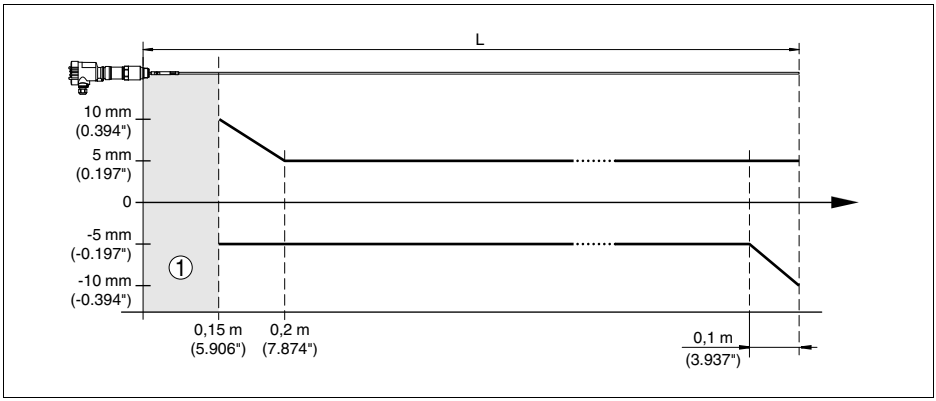


Fig. 19: Deviation VEGAFLEX 66 in rod version in oil

1 Dead zone - no measurement possible in this area
L Probe length

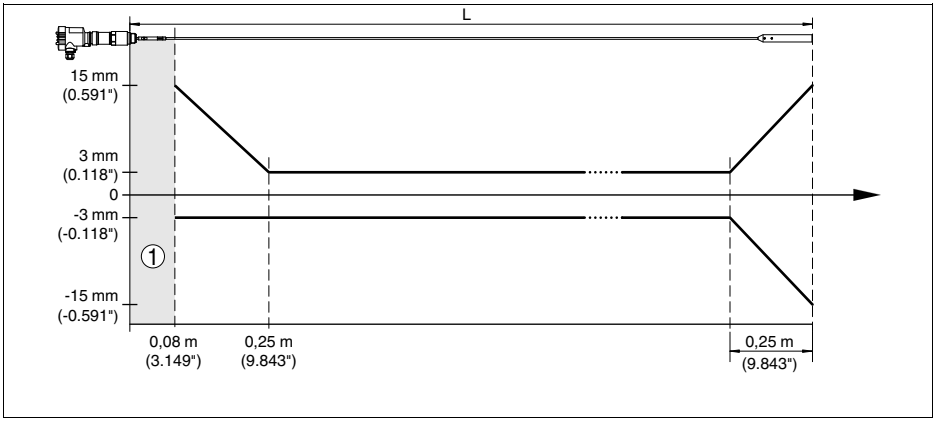


Fig. 20: Deviation VEGAFLEX 66 in cable version, probe length L < 20 m in water

1 Dead zone - no measurement possible in this area
L Probe length

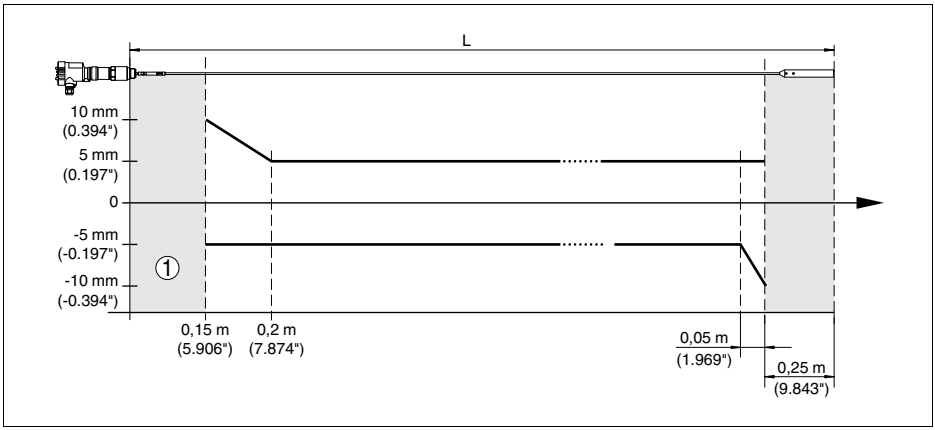


Fig. 21: Deviation VEGAFLEX 66 in cable version, probe length L < 20 m in oil

1 Dead zone - no measurement possible in this area
L Probe length

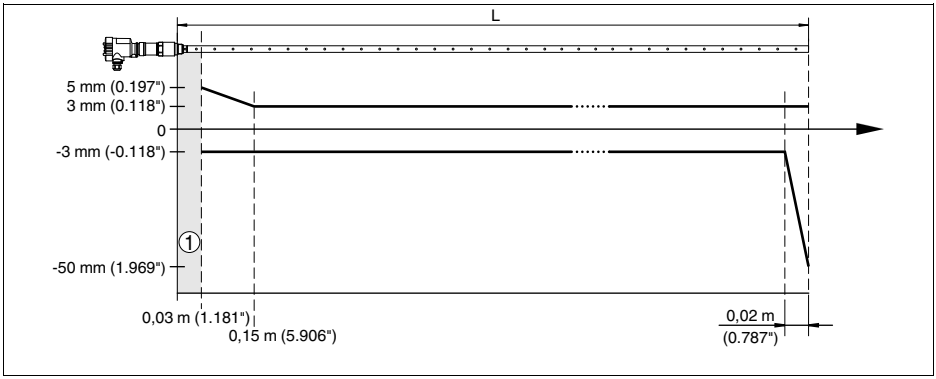


Fig. 22: Deviation VEGAFLEX 66 in coax version in water

1 Dead zone - no measurement possible in this area
L Probe length

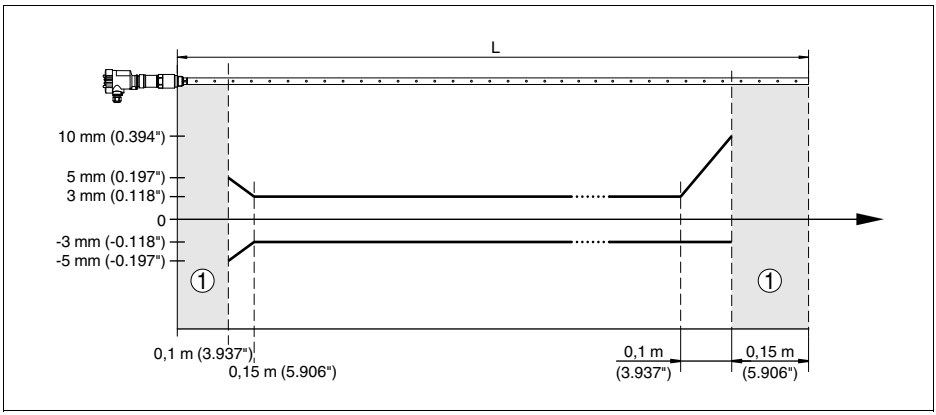


Fig. 23: Deviation VEGAFLEX 66 in coax version in oil

1 Dead zone - no measurement possible in this area
L Probe length

Influence of the ambient temperature to the sensor electronics	
Temperature drift	0.03 %/10 K relating to the max. measuring range or max. 0.3 %
Temperature drift - Digital output	3 mm/10 K relating to the max. measuring range or max. 10 mm

Ambient conditions	
Ambient, storage and transport temperature	-40 … +70 °C (-40 … +158 °F)

Process conditions

Process pressure	-1 … +100 bar/-100 … +10000 kPa (--14.5 … +1450 psig), depending on the process fitting
Process temperature	-20 … +250 °C (-4 … +482 °F)
	The measurement error from the process conditions is in the specified pressure and temperature range of below 1 %.

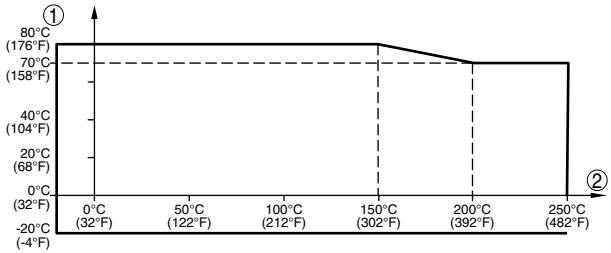


Fig. 24: Ambient temperature - process temperature (version -20 … +250 °C/-4 … +482 °F)

1 Ambient temperature
2 Process temperature (depending on the seal material)

Electromechanical data - version IP 66/IP 67

Cable entry

– Double chamber housing
  - 1 x cable gland M20 x 1.5 (cable: ø 5 … 9 mm), 1 x blind stopper M20 x 1.5; plug M12 x 1 for VEGADIS 61 (optional)

  or:

  - 1 x closing cap ½ NPT, 1 x blind stopper ½ NPT, plug M12 x 1 for VEGADIS 61 (optional)

  or:

  - 1 x plug (depending on the version), 1 x blind stopper M20 x 1.5; plug M12 x 1 for VEGADIS 61 (optional)

Spring-loaded terminals for wire cross-section: 2.5 mm^2 (AWG 14)

Indicating and adjustment module

Voltage supply and data transmission	through the sensor
Indication	LC display in dot matrix
Adjustment elements	4 keys
Protection rating	
– unassembled	IP 20

– mounted into the sensor without cover	IP 40
Materials	
– Housing	ABS
– Inspection window	Polyester foil

Voltage supply

Operating voltage	
– Non-Ex and Ex-d instrument	20 … 72 V DC, 20 … 253 V AC, 50/60 Hz
Max. power consumption	4 VA; 2.1 W

Electrical protective measures

Protection rating	IP 66/IP 67
Overvoltage category	III
Protection class	I

Functional safety (SIL)

Functional safety is already activated on instruments with SIL qualification ex factory. On instruments without SIL qualification ex factory, the functional safety must be activated by the user via the indicating and adjustment module or via PACTware for applications according to SIL.

Functional safety according to IEC 61508-4	
– Single channel architecture (1oo1D)	up to SIL2
– double channel diversitary redundant architecture (1oo2D)	up to SIL3

You can find detailed information in the supplied Safety Manual of the instrument series or under "www.vega.com", "*Downloads*", "*Approvals*".

Approvals

Depending on the version, instruments with approvals can have different technical data.

For these instruments, the corresponding approval documents have to be taken into account. These are part of the delivery or can be downloaded under www.vega.com via "*VEGA Tools*" and "*serial number search*" as well as via "*Downloads*" and "*Approvals*".

10.2 Dimensions

The following dimensional drawings represent only an extract of the possible versions. Detailed dimensional drawings can be downloaded on www.vega.com under "*Downloads*" and "*Drawings*".

Housing

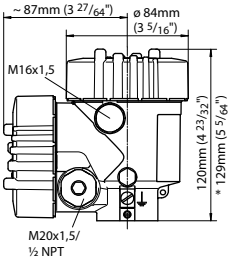


Fig. 25: Double chamber housing (with integrated indicating and adjustment module the housing is 9 mm/0.35 in higher)

VEGAFLEX 66 - cable, rod version (-20 … +250 °C/-4 … +482 °F)

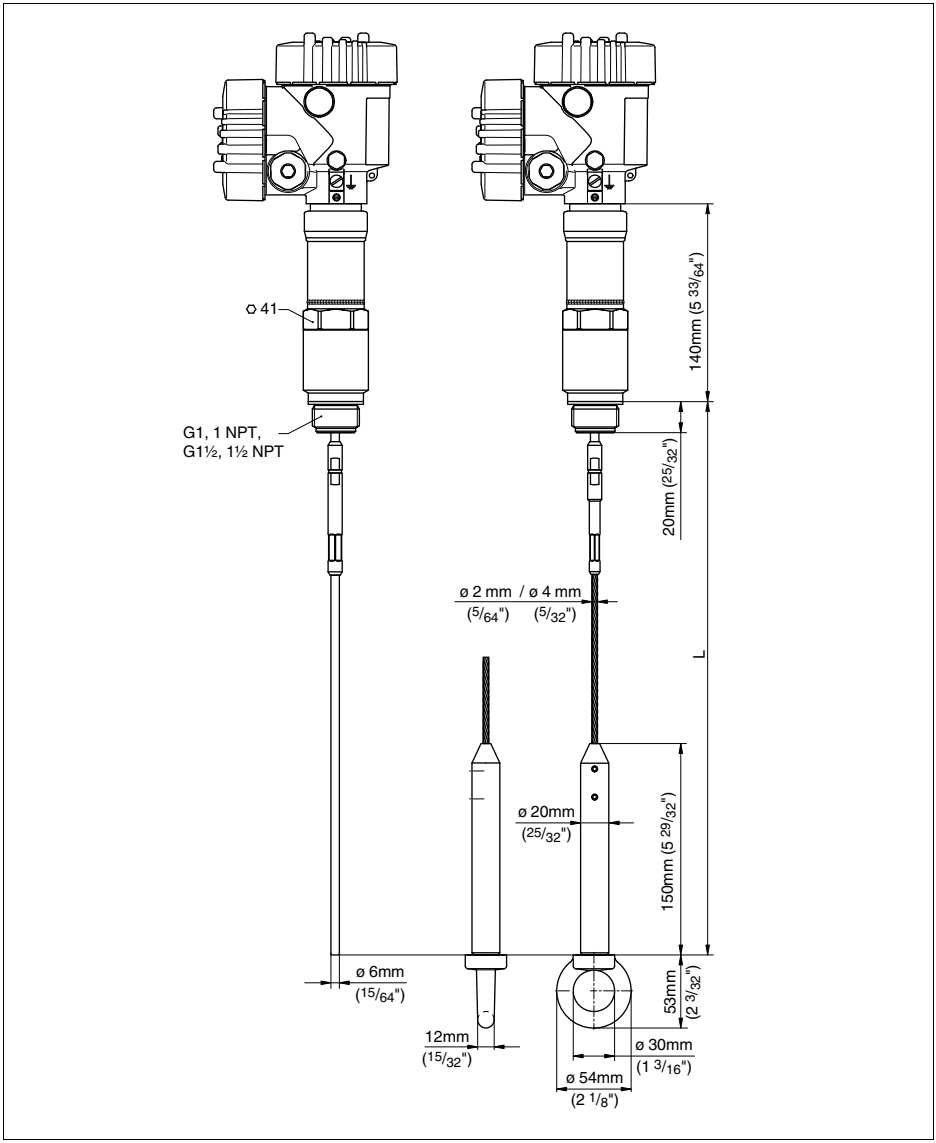


Fig. 26: VEGAFLEX 66 - cable, rod version with thread (-20 … +250 °C/-4 … +482 °F)

L Sensor length, see chapter "Technical data"
Lug optionally

VEGAFLEX 66 - coax version (-20 … +250 °C/-4 … +482 °F)

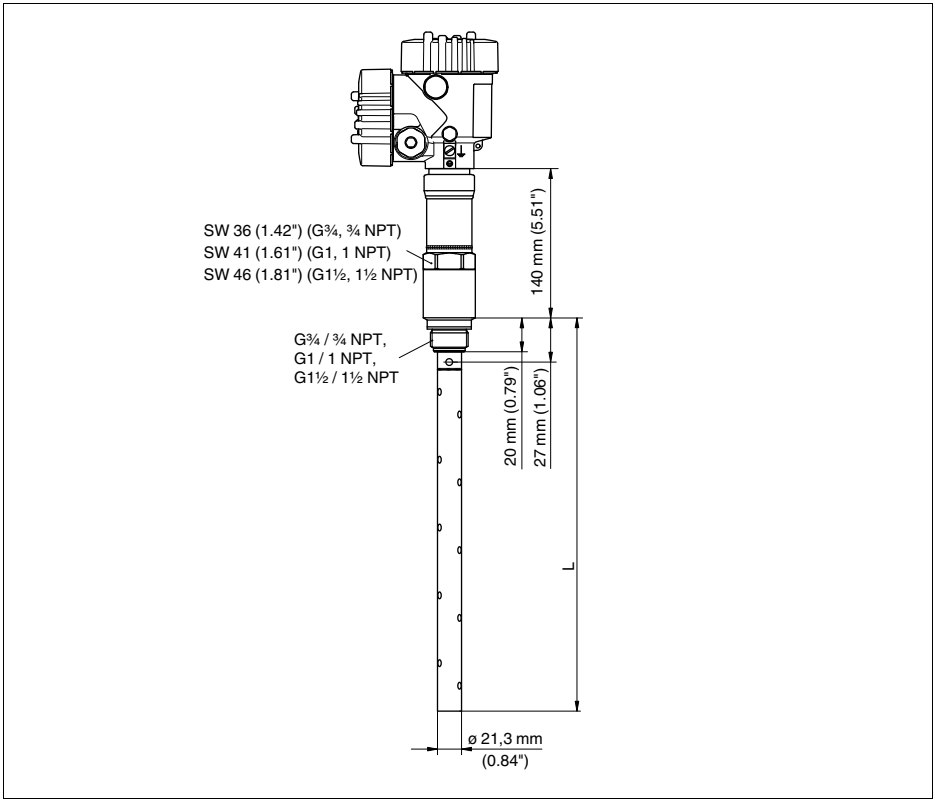


Fig. 27: VEGAFLEX 66 - coax version with thread (-20 … +250 °C/-4 … +482 °F)

L Sensor length, see chapter "Technical data"

10.3 Industrial property rights

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Further information see http://www.vega.com.
Only in U.S.A.: Further information see patent label at the sensor housing.

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